Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Improving 9-1-1 Reliability	)	PS Docket No. 13-75
	)	
Reliability and Continuity of Communications Networks, Including Broadband Technologies	)	PS Docket No. 11-60

COMMENTS OF MISSION CRITICAL PARTNERS

Mission Critical Partners, Inc. ("MCP") submits the following comments in the above captioned matter. MCP provides executive consulting to clients with public and life safety communications missions throughout North America. With a professional staff of more than 60 employees, the MCP team provides services in 9-1-1 planning, networking, and system analysis; facility and technology integration; public safety consolidation/shared services transitions; radio communications; broadband deployment; and emergency management communications.

MCP wholly endorses the Commission's proactive approach of identifying the root causes of 9-1-1 failures and taking making timely modifications to the existing rules.

I. THE CLEAR NEED FOR COMMISSION ACTION

The record and comments in this matter provide clear evidence of a need for Commission action. Although there have been 27 documented derecho events in the last 40 years throughout the United States,[1] the devastating effects of the June derecho were not *caused* by a weather event. The devastating impacts to the 9-1-1 systems were, in large part, preventable; they were caused by poor network architecture, improper maintenance, lack of testing, poor documentation, and an absence of training. Similar widespread failures of the 9-1-1 system could occur anywhere in the nation where an absence of

[1] *See* About Derechos, National Oceanic and Atmospheric Administration – Storm Prediction Center, http://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm

even basic adherence to the most common industry standards by carriers is present. The initiating event may be one of many that are unplanned or unpredictable like a derecho – from a weather event, a widespread power disruption, or even a man-made cause.

Contrary to the position of some commenters, promoting the development of best practices will not be effective, nor will rules that permit voluntary compliance.[2] The abundance of best practices, codes, and industry standards related to emergency power systems for life safety systems is staggering.[3] We suggest that these codes, standards, and best practices have been voluntary for carriers to implement for years, yet the record is clear that in many cases they were not.

As carriers shift more resources toward emerging technologies like fiber-to-the-premise (FTTP), the conditions of traditional outside plant and central office facilities[4] – on and through which much of the 9-1-1 system traverses – are suffering. The tariffs and fees on public safety answering points (PSAPs), are not similarly declining however, but rather they are increasing annually. Many PSAP managers are faced daily with the stark reality that tariffs and fees versus the quality of 9-1-1 services are inversely proportional.

In many areas of the country the planning and implementation of Next Generation 9-1-1 (NG9-1-1) Emergency Services IP networks (ESInets) are in their infancy. We agree with the Commission that the legacy circuit-switched networks will be in place for some time to come. The likelihood of a 9-1-1 system absent of traditional local exchange carriers (LECs) is highly doubtful, as many deployments will still rely on "last-mile" connectivity to more advanced networks. Similarly, many NG9-1-1 deployments will maintain legacy gateways to support traditional 9-1-1 applications and users.

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[2] *See* Reply Comments of Verizon and Verizon Wireless, PS Docket 11-60 (Sep. 12, 2012).

[3] *See* National Fire Protection Association Standard 70, National Fire Protection Association Standard 101, National Fire Protection Association Standard 110, IEEE Std 446-1995. (Revision of IEEE Std 446-1987). IEEE Recommended Practice for. Emergency and Standby Power. Systems for Industrial and Commercial Applications, ANSI/TIA-942 - Telecommunications infrastructure standard for data centers.

[4] "Facilities" refers to both outside plant facilities and controlled environments, such as Central Offices.

The issues raised and the questions asked by the Commission in this Notice[5] – related to network resiliency and emergency power redundancy – are not only salient to the 9-1-1 and PSAP communities, they are also key issues driving the deployment of the Nationwide Public Safety Broadband Network (NPSBN). The data that the NPSBN will carry is no less critical than the 9-1-1 network, and it is highly likely that the NPSBN and future NG9-1-1 systems will converge to a single network that will pass through and travel over non-governmental networks supplied by CLECs and ILECs. The future convergence of these two networks – the NPSBN and NG9-1-1 networks – should be a motivating factor for the Commission to take swift, measurable, and meaningful action in this matter.

II. ENTITIES SUBJECT TO PROPOSALS

1. 9-1-1 Service Provider Definition

As the Commission asks in this Notice, we feel that the proposed definition of the term "9-1-1 service provider" should be expanded to more broadly capture the role that backhaul providers play. It is not uncommon in the current 9-1-1 environment for a failure or trouble report to be closed with only a reference to a "carrier failure." LECs utilize higher tier carriers to aggregate traffic where practical or convenient. This use of higher tier carriers is not directly addressed in the proposed definition, which could be interpreted as specifically exempting backhaul carriers as they do not provide their services "directly to a PSAP."

While the proposed definition adequately covers entities involved in ESInets, a backhaul provider contracted by an entity would not be subject to the rules as they are not providing service "directly to a PSAP." It is quite likely that ESInets will be transported across a variety of networks that may not be wholly owned and operated by public sector entities, with local and regional ESInets aggregating on larger backhaul mediums. Backhaul or aggregation providers should be subject to the same rules, as they too are transporting 9-1-1 traffic.

[5] *See* Improving 9-1-1 Reliability, et al., PS Docket Nos. 13-75, 11-60, *Notice of Proposed Rulemaking*, FCC 13-33 (rel. Mar. 20, 2013) (*9-1-1 Reliability NPRM*).

Accordingly, we recommend that the proposed definition of "9-1-1 service providers" should be expanded to read:

> *"All entities, including ILECs, that provide 9-1-1 call routing* ***and transport****, ALI, emergency services Internet protocol networks (ESInets), and similar services* ~~*directly to a PSAP*~~*."*

2. Data Centers Subject to Requirements

The Commission is correct to recognize the critical role that data centers and other types of data facilities will play in a Next Generation 9-1-1 (NG9-1-1) environment. NG9-1-1 deployments will present a wide range of operational benefits to PSAPs, and they will create a significant number of new options in the design and architecture of the networks. These new choices will include network providers, data center locations, levels of redundancy, and control over diversity to name just a few. These choices have rarely been available to PSAPs in the deployment of traditional 9-1-1 networks, but they will certainly be factors considered in NG9-1-1 deployments.

Many of the key decisions related to the reliability and redundancy of NG9-1-1 and ESInet design will be made by the PSAPs rather than by a LEC. In many local governments the concepts of high reliability and high uptime data centers are very well known and implemented. As new ESInets are designed, PSAPs will play a key role in the selection of data centers and network providers that meet *their* requirements. PSAPs will have the ability to choose data centers that not only follow and apply industry standards, but *exceed* them.

Data centers in the competitive marketplace are driven to keep pace with or exceed such critical standards such as ANSI/TIA-942,[6] and many seek voluntary certification that they meet such stringent standards. Moreover, data centers in the competitive marketplace not only permit, but often encourage inspections and rigorous review of their designs by potential clients. In a competitive environment,

[6] Telecommunications Industry Association. ANSI. TIA-942-2005 Telecommunications Infrastructure Standard for Data Centers.

PSAPs or their agents will have the ability to conduct such reviews and make decisions based on the designs of critical power systems, physical and logical diversity of infrastructure connections, and testing procedures to name just a few.

Reconfiguring the existing 9-1-1 system to meet a stringent standard such as TIA-942 would be financially impractical. Given the opportunities and choices that NG9-1-1 deployments will provide, allowing PSAPs to maintain local control of their ESInet designs and datacenters will allow for more rapid and cost-appropriate decisions. The Commission should defer the responsibility for ESInet datacenter standards development to industry associations such as the National Emergency Number Association (NENA). Industry standards bodies such as NENA are established, fervently represent the interests of the PSAP community, and can be more fluid in their promulgation of standards and revisions.

III. RECOMMENDATIONS FOR IMPROVING 9-1-1 RELIABILITY

As the *Derecho Report*[7] addressed, insight and visibility into the design and compliance of the traditional ILEC-based 9-1-1 networks has been limited, at best. Although a system of voluntary self-reporting is an improvement over current practices, such a system by itself would do little to ensure 9-1-1 reliability. We feel that there are several regulatory and design changes that would dramatically improve 9-1-1 service once implemented.

1. The Need for Routine Circuit Auditing

Single points of failure in the design of 9-1-1 networks cannot and should not be acceptable. As noted in the *Derecho Report*, physical audits of critical circuit paths would have documented serious diversity issues that could have been addressed by the PSAP community.[8] Throughout the nation, PSAPs are not routinely requesting physical audits of circuits nor are many carriers willing or able to provide them.

[7] FCC PUB. SAFETY & HOMELAND SEC. BUREAU, IMPACT OF THE JUNE 2012 DERECHO ON COMMUNICATIONS NETWORKS AND SERVICES: REPORT AND RECOMMENDATIONS (PSHSB, rel. Jan. 10, 2013), *available at* http://www.fcc.gov/document/derecho-report-and-recommendations (*Derecho Report).*

[8] *Id.* At 29.

Our experience in various locations in the country has been that many carriers are reluctant or unwilling to provide detailed physical circuit maps due to the failings that they reveal. The Commission should require that carriers – particularly "last mile" providers – must provide detailed physical audits of all critical circuits at the request of the PSAP. Furthermore, given the role of higher tier backhaul carriers in a LEC environment, this requirement for physical audits should extend to all levels of the 9-1-1 system – present and future.

Indeed we agree with the Commission that the costs associated with these audits are modest, as many of the trunks and data circuits to a single PSAP will follow similar routes. That is to say that although a PSAP may have 50 trunks, it is common that many of the trunks will follow only one or two paths and thus a commensurate number of audits is not the rule but rather the exception. In an ESInet environment, path auditing becomes a much faster and accurate task given the tools available in IP networks. If network providers accurately and consistently document the locations of their network equipment and provide this data to PSAPs, the PSAPs themselves can routinely conduct path audits via automated tools.

Another particularly troubling aspect of many recent NG9-1-1 proposals has been the use of wide-area "clouds" to represent critical segments of a carrier's network. Many proposals include substantial portions of an ESInet that are simply labeled with such ambiguous titles as "Highly Redundant MPLS network," "MPLS #1," or "High Capacity Transport" without any specificity. Though the experienced subject matter expert can adequately address concerns related to this ambiguity, we are concerned that some PSAPs may be lulled into a false sense of security simply by the mere appearance of dual lines on a drawing and a "Highly Redundant" cloud.

2. Implementing Circuit Audits

The need for both physical and logical circuit audits is critical in a reliable and redundant 9-1-1 network. The Commission accurately notes that despite a plethora of widely-available best practices, not to mention repeated guidance by the Commission that they should be reviewed and implemented, carriers

still failed to address even basic diversity issues.[9] As the deployment of NG9-1-1 ESInets increases in pace, technologies such as Multiprotocol Label Switching (MPLS), Data Over Cable Service Interface Specification (DOCSIS), and Long Term Evolution (LTE) – which are new to the traditional 9-1-1 community – will see increased use.

We recommend that the Commission consider the increased use of the Telecommunications Service Priority (TSP) system as the basis for circuit auditing. By expanding the current TSP rules, the Commission could require that any circuits identified by a PSAP as priority levels 3, 4, or 5 would qualify for, and require carriers to provide physical and logical circuit audits. For new circuits these audits would be triggered upon receipt of the initial order that is accompanied by a TSP Authorization Code. For existing circuits, carriers could be required to provide audits of any circuits of record that are registered with the appropriate priorities as of an effective date in the future. PSAPs should also have the ability to request timely, fee-based audits at any time.

We feel that the benefits of such a policy are numerous. First, linking circuit audits to the TSP program would require PSAPs to become familiar with the program and benefits, and would incentivise registration of critical circuits in order to generate audits. Second, by requiring participation in the TSP program in order to generate circuit audits, the Commission would be strengthening the 9-1-1 system by further identifying and prioritizing the restoration of critical circuits. Finally, by using a system that is already in place and codified, the establishment of criteria relative to a "qualified circuit" has already been addressed. Additionally, these audits – if provided to or through the TSP Program Office – would provide the Commission with a greater insight into the redundancy and associated reliability of the 9-1-1 system throughout the country.

It should be noted that changes to the TSP program are similarly needed to address new technologies that were not initially considered due to their limited deployment. Several new broadband technologies such as DOCSIS, satellite, and LTE systems are not adequately addressed by the TSP

[9] *Id.* At 29.

program, and as a result the respective network providers are not held to the same standards for initial provisioning and restoration. The Commission should review the TSP program and expand the rules to include all of the new technologies and mediums used in a modern PSAP for 9-1-1 call delivery.

Requiring timely circuit audits places more control of reliability and redundancy in the hands of those responsible for its ultimate delivery – the 9-1-1 PSAP professionals. Equipped with detailed physical and logical circuit audits, PSAP personnel can make informed decisions based on knowledge of local issues and capabilities. Likewise, in the event of a widespread issue such as a derecho, the local 9-1-1 authority can take a much more active role in the prioritization of emergency management resources based upon detailed knowledge of critical network facilities and the physical paths of critical circuits.

3. Sufficient Backup Power at Central Offices

The National Fire Protection Association (NFPA) Standard 110 classifies and defines the most critical emergency power systems as Level 1 – those systems in which failure of the equipment to perform could result in loss of human life or serious injury.[10] PSAPs are routinely designed and constructed to this standard throughout the country, and many of its other sections are applied to the implementation of critical PSAP emergency power systems. Likewise, PSAPs and support agencies routinely conduct audits and assessments of PSAPs for compliance with NFPA 110 as it is clear to the PSAP community that functional and routinely tested emergency power systems are critical to their operations. It is difficult to comprehend how emergency power systems could fail to the degree that they did within Verizon's network, especially given the types of fundamental, easily-identified causes that the *Derecho Report* revealed.[11]

There are no lack of standards and best practices that apply to emergency power systems. NFPA 110 is a guiding document that is used throughout the PSAP community, as are best practices published

[10] *See NFPA 110: Standard for Emergency and Standby Power Systems,* Section 4.4.1, National Fire Protection Association, 2013.
[11] *Derecho Report* at 17.

by the Communications Security, Reliability, and Interoperability Council (CSRIC) and the Alliance for Telecommunications Industry Solutions (ATIS). Emergency power system reliability and testing are topics that are prevalent across many life safety industries, and there are frequently articles published on the topic in trade journals.

A 2007 article in a trade journal identified the top nine reasons that generators fail to start; four of the nine reasons were identified as causes of emergency power system failures at central offices in the *Derecho Report*.[12] Similarly, a 2006 publication by The Joint Commission[13] notified its members that adherence to NFPA 110 alone was not sufficient to prepare for major catastrophes.[14] The Joint Commission publication made several poignant recommendations to its members in the wake of the 2003 Northeast Blackout followed by major hurricanes Charlie, Francis, Ivan and Jean in 2004 and Katrina and Rita in 2005. These recommendations were clear that meeting the NFPA codes is only the start of an emergency power testing program, and must be coupled with comprehensive generator load testing and maintenance programs. The Joint Commission publication makes other salient recommendations to its members such as:

> "Assess the need for additional redundancy through portable, truck-mounted generators and develop procedures to isolate generators from problem areas and to tie in supplemental equipment not normally fed by emergency power."

> "Maintain written procedures and record all test data. Written procedures help facility managers control the testing process and require testing personnel to take responsibility for performing required tasks."

[12] *Id.* at 17-19.

[13] The Joint Commission is an independent, not-for-profit organization that accredits and certifies more than 20,000 health care organizations and programs in the United States. Joint Commission accreditation and certification is recognized nationwide as a symbol of quality that reflects an organization's commitment to meeting certain performance standards. *See* About The Joint Commission, http://www.jointcommission.org/about_us/about_the_joint_commission_main.aspx

[14] *See* Sentinel Event Alert, Issue 37, September 6, 2006, The Joint Commission, http://www.jointcommission.org/assets/1/18/SEA_37.PDF

We agree with the Joint Commission that implementation of a single standard such as NFPA 110 is not sufficient to address all of the complex factors that must be considered for critical, life-safety emergency power systems. NFPA 110, is, however, an excellent resource that the Commission should use for at least baseline compliance of 9-1-1 service entities. NFPA 110, if properly implemented, would have identified several of the service-effecting issues identified in the *Derecho Report*: insufficient fuel, exhausted batteries, overload conditions, and record keeping.

We do not believe that third-party inspections of central offices are necessary for compliance nor implementation of an emergency power standard by 9-1-1 service entities. By their shear nature, carriers are technology-driven organizations with sufficient technical resources to implement these fundamental best practices. Lacking a rule or regulation mandating implementation, however, carriers have little to motivate them to make these modest investments. It is in this arena of rulemaking that the Commission can and should act to require basic compliance.

We recommend that the Commission require, by rulemaking, that 9-1-1 service entities self-certify that critical facilities are compliant with NFPA 110 standards *at a minimum.* Documentation of self-certification should be made available to PSAP personnel upon request, or be provided to the Commission for centralized archival.

4. Having Generators at Central Offices

We applaud the Commission's consideration of the financial impacts to provide backup power to all central offices. There are, however, many unknown variables that would need to be quantified before a true accounting of the costs could be developed. As in most technology planning, there is no "one size fits all" cost for a generator and the associated services required to make it operational, nor would it be helpful in this critical discussion to offer an estimate. Factors that would need to be considered include the physical size of the facility, the connected electrical load, and future growth or consolidation efforts. In some cases it may even be possible for a carrier to segregate critical components and only provide

emergency power to a limited critical load.

The need for reliable, redundant emergency power systems at central offices has been well documented in the *Derecho Report*.[15] One of the key failures of the carriers that was not adequately addressed was the relationship – or lack thereof – of the carriers to local emergency management officials well prior to the derecho, or any catastrophic event for that matter. PSAP officials and local emergency management officials are well versed in planning for and providing power to critical facilities in times of disaster. Emergency management officials routinely plan cooperatively and conduct drills with acute and long-term health care facilities, schools, and other facilities that would be at high risk following a widespread power interruption.

In 2010, 43 cities and towns across the United States received more than $8 million through the Department of Energy's Local Energy Assurance Planning Program. These grants funded work to improve electricity reliability and security throughout the nation. To build on this effort, in 2011 the Department of Energy released the second version of its Local Government Energy Assurance Guidelines.[16] Many local governments are implementing the planning practices described in the guidelines to develop not only robust redundancies for critical facilities, but more importantly to open the dialogue with critical stakeholders before disasters occur.

Emergency management officials are often well steeped in local geographic, technical, and resource knowledge. Emergency management officials typically work very closely with electrical suppliers and utilities on a regular basis, and are often co-located during disasters to aid in the speed of coordination. Furthermore, emergency management agencies normally maintain caches of portable generators and in many cases larger, trailer mounted units. When faced with a widespread loss of 9-1-1 service to a served population, emergency managers would consider such a situation to be just as critical

[15] *Derecho Report* at 17-19.

[16] *See* Local Government Energy Assurance Guidelines Version 2.0, Public Technology Institute and Department of Energy Office of Electricity Delivery & Energy Reliability, http://dl.dropboxusercontent.com/u/14265518/leap/PTI_Energy_Guidelines.correx.v2.pdf

as the loss of electrical service to an acute or long-term care facility.

Rarely, however, do 9-1-1 service entities avail themselves of the emergency management pre-planning process. The Commission should urge 9-1-1 service entities to be more proactive in pre-planning of critical facilities with the emergency management agencies having jurisdiction. The capabilities and vulnerabilities of critical facilities should be known well in advance to emergency managers, and the implications of disruptions to those facilities should similarly be known and documented.

Emergency managers play a vital role in helping a population plan for and recover from a disaster. To that end emergency managers and their support organizations are intimately involved in planning and drills related to some of the most secure and critical nuclear and chemical facilities in the United States. Little attention, however, is placed on the key role that carrier facilities play in what is perhaps the second most critical infrastructure component of our daily lives after electricity – our ability to communicate.

5. Notifications to PSAPs

Notifications of failures within the 9-1-1 system to PSAP personnel have improved over the past five years, although there are still significant gaps that have yet to be addressed. In recent years we have seen progress from basic voice notifications to PSAPs from carrier network control centers, to a more widespread use of automated e-mail alerts driven by carrier trouble reporting systems. In many cases these automated trouble reports are cryptic in their terminology or references, and were meant as a stop-gap measure to appease PSAPs in the wake of major failures such as the derecho.

The transition to NG9-1-1 services should address notification gaps, however, as ESInets will be IP-based and a wealth of tools, protocols, and methods exist to monitor and timely notify administrators of impairments. New NG9-1-1 software packages will contain logging, reporting, and notification mechanisms to satisfy even the most demanding PSAPs. In a properly designed and deployed ESInet, the entire call flow of a 9-1-1 call can be simulated through all critical facilities without any impact to the

PSAP. These automated tools and simulations can be set to continuously and proactively test and report on the health of an ESInet in much the same way as tools monitor the worldwide health of the Internet.[17]

IV. CONCLUSION

MCP appreciates the opportunity to comment on the issues, and we strongly support the Commission for its leadership in strengthening the nation's public safety communications systems. We urge the Commission to take substantial and measurable steps that will make meaningful improvements to not only the current 9-1-1 system, but future deployments of NG9-1-1 networks and the Nationwide Public Safety Broadband Network. The Commission should consider any steps that it can take to hasten deployment of NG9-1-1 networks, for as we have outlined, many of the shortfalls of the traditional 9-1-1 network are much more easily remedied in the NG9-1-1 environment.

We look forward to future opportunities to provide input and guidance on these and other critical matters.

Respectfully submitted,

/s/

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[17] Keynote, Internet Health Report, http://www.internetpulse.net/